(19) JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: **09238118 A**

(43) Date of publication of application: **09 . 09 . 97**

(51) Int. Cl **H04J 3/00**
H04J 3/14
H04L 29/08
H04L 29/14
H04Q 11/04

(21) Application number: **08042345**

(22) Date of filing: **29 . 02 . 96**

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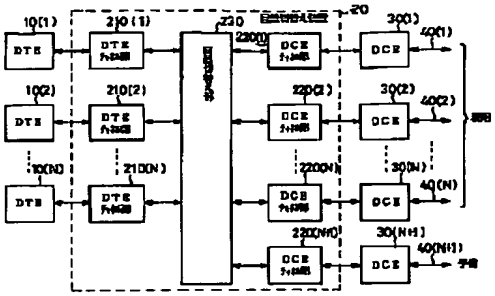
(54) **LINE CHANGEOVER DEVICE**

(57) Abstract:

PROBLEM TO BE SOLVED: To attain line changeover by providing a function converting a signal transmission speed into a predetermined unified speed from a substantial speed and restoring the speed to the substantial speed so as to use a time switch.

SOLUTION: In the case of sending a signal by a terminal equipment 10(X) (X=1, 2,..., N), a serial signal consisting of a transmission data signal SD and a transmission request signal RS is outputted. The serial signal is given to a DTE channel section 10(X), in which the transmission speed is converted from a substantial speed into a predetermined unified speed and fed to a DCE channel section 220(X) via a line changeover section 230. When an active line 40(Z) is faulty, the signal is fed to a standby DCE channel section 220(N+1). The supplied serial signal is restored to the substantial speed from the unified speed and the serial signal consisting of the SD and RS is decoded and sent to the active line 40(X) or the standby line 40(N+1) via an active line terminator 30(X) or a standby line terminator 30(N+1). This is similar to receive the signal from the line 40(X) or the line 40(N+1).



(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平9－238118

(43)公開日　平成9年(1997)9月9日

(51)Int.Cl.⁶		識別記号	庁内整理番号	FI			技術表示箇所
H04J	3/00			H04J	3/00	R	
						X	
	3/14				3/14	Z	
H04L	29/08			H04Q	11/04	301B	
	29/14			H04L	13/00	307C	

審査請求　未請求　請求項の数4　ＯＬ　（全 9 頁）　最終頁に続く

(21)出願番号　特願平8－42345

(22)出願日　平成8年(1996)2月29日

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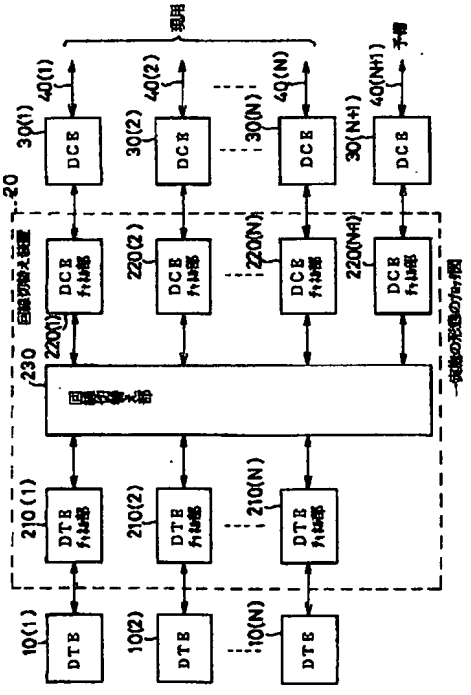
(54)【発明の名称】　回線切替え装置

(57)【要約】

【課題】　チャネル数を多くしたり、複雑な切替え動作を行う場合にも、回線切替え装置が複雑にならないようにする。

【解決手段】　送信信号の伝送速度を本来の速度から予め定めた統一速度に変換するとともに、受信信号の伝送速度を統一速度から本来の速度に戻すＤＴＥチャネル部２１０（１）～２１０（Ｎ）と、送信信号の伝送速度を統一速度から本来の速度に戻すとともに、受信信号の伝送速度を本来の速度から統一速度に変換するＤＣＥチャネル部２２０（１）～２２０（Ｎ＋１）と、時間スイッチにより回線の切替えを行う回線切替え部２３０とを有する。



【特許請求の範囲】
【請求項１】　信号の伝送速度が異なる複数の端末装置で共用され、各端末装置の現用回線の使用が不可能になると、この端末装置の使用回線を現用回線から予備回線に切り替える回線切替え装置において、
各端末装置ごとに設けられ、対応する端末装置から出力される送信信号の伝送速度を本来の速度から予め定めた統一速度に変換する複数の速度変換手段と、
この複数の速度変換手段から出力される信号を時分割多重し、回線の切替え要求に従って、この時分割多重出力のタイムスロットを入れ替えることにより、使用回線を現用回線から予備回線に切り替える回線切替え手段と、
各回線ごとに設けられ、前記回線切替え手段から供給される信号の伝送速度を前記統一速度から前記本来の速度に戻す複数の速度逆変換手段とを備えたことを特徴とする回線切替え装置。
【請求項２】　前記速度変換手段は、
対応する端末装置から出力される送信信号を所定のフレームに割り付けることにより、前記統一速度の整数分の１の中間速度を有する信号を生成する割付け手段と、
この割付け手段から出力される信号の伝送速度を前記中間速度から前記統一速度に変換する速度整合手段とを備え、
前記回線切替え手段は、
前記複数の速度変換手段から出力される信号を回線数分のタイムスロットを有するように時分割多重する多重手段と、
この多重手段から出力される時分割多重信号のタイムスロットを、回線の切替え要求に従って入れ替える時間スイッチ手段と、
この時間スイッチ手段から出力される時分割多重信号を各被多重信号ごとに分離し、各分離出力を対応する速度逆変換手段に供給する分離手段とを備え、
前記速度逆変換手段は、
前記回線切替え手段から供給される信号の伝送速度を前記統一速度から前記中間速度に変換する速度整合手段と、
この速度整合手段から出力される信号のフレームから前記送信信号を抽出する抽出手段とを備えたことを特徴とする請求項１記載の回線切替え装置。
【請求項３】　信号の伝送速度が異なる複数の端末装置で共用され、各端末装置の現用回線の使用が不可能になると、この端末装置の使用回線を現用回線から予備回線に切り替える回線切替え装置において、
各回線ごとに設けられ、対応する回線を介して送られてきた受信信号の伝送速度を本来の速度から予め定めた統一速度に変換する複数の速度変換手段と、
この複数の速度変換手段から出力される信号を時分割多重し、回線の切替え要求に従って、この時分割多重出力のタイムスロットを入れ替えることにより、使用回線を現用回線から予備回線に切り替える回線切替え手段と、
各端末装置ごとに設けられ、前記回線切替え手段から供給される信号の伝送速度を前記統一速度から前記本来の速度に戻す複数の速度逆変換手段とを備えたことを特徴とする回線切替え装置。
【請求項４】　前記速度変換手段は、
対応する回線を介して送られたきた受信信号を所定のフレームに割り付けることにより、前記統一速度の整数分の１の中間速度を有する信号を生成する割付け手段と、
この割付け手段から出力される信号の伝送速度を前記中間速度から前記統一速度に変換する速度整合手段とを備え、
前記回線切替え手段は、
前記複数の速度変換手段の前記速度整合手段から出力される信号を時分割多重する多重手段と、
この多重手段から出力される時分割多重信号のタイムスロットを、回線の切替え要求に従って入れ替える時間スイッチ手段と、
この時間スイッチ手段から出力される時分割多重信号を各被多重信号ごとに分離し、各分離出力を対応する速度逆変換手段に供給する分離手段とを備え、
前記第２の速度変換手段は、
前記回線切替え手段から供給される信号の伝送速度を前記統一速度から前記中間速度に変換する速度整合手段と、
この速度整合手段から出力される信号のフレームから前記受信信号を抽出する抽出手段とを備えたことを特徴とする請求項３記載の回線切替え装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】この発明は、信号の伝送速度が異なる複数の端末装置で共用され、回線障害や装置障害により、各端末装置の現用回線の使用が不可能になると、この端末装置の使用回線を現用回線から予備回線に切り替える回線切替え装置に関する。
【０００２】
【従来の技術】一般に、専用回線を用いたデータ伝送システムにおいては、現用回線の他に、予備回線を設け、回線障害や装置障害により、現用回線の使用が不可能になると、使用回線を現用回線から予備回線に切り替えるようになっている。
【０００３】ところで、上述したデータ伝送システムにおいては、端末装置として、通常、複数の端末装置が設けられる。したがって、このシステムに回線切替え装置を設ける場合は、回路構成の簡素化の観点から、すべての端末装置で共用される回線切替え装置を設けることが望まれる。
【０００４】また、上述したデータ伝送システムにおいては、信号として、通常、日本工業規格（ＪＩＳ）　Ｘ５１０１で規定される信号が用いられる。このＪＩＳ

X5101においては、伝送速度が異なる複数の信号が用意されている。したがって、複数の端末装置が存在する場合は、各端末装置で使用される信号の伝送速度が異なる可能性がある。このため、複数の端末装置に共用される回線切替え装置を構成する場合は、伝送速度の異なる複数の信号に対処可能な構成が望まれる。

【0005】以上の要望に応えるため、従来は、リレー等の空間分割素子で構成される空間スイッチを用いて複数の端末装置で共用される回線切替え装置を構成するようになっていた。

【0006】

【発明が解決しようとする課題】しかしながら、このような構成では、チャネル数を多くしたり、複雑な切替え動作を行う場合には、空間分割素子が多数必要になるため、回線切替え装置が複雑になるという問題があった。また、これにより、回線切替え装置そのもののハードウェア障害を無視することができなくなるという問題があった。

【0007】

【課題を解決するための手段】上記課題を解決するために、この発明は、信号の伝送速度を本来の速度から予め定めた統一速度に変換したり、この速度から本来の速度に戻す機能を設けることにより、時間スイッチを用いて回線切替えを行うようにしたものである。

【0008】

【発明の実施の形態】以下、図面を参照しながら、この発明の実施の形態を詳細に説明する。

【0009】［一実施の形態］

［構成］図1は、この発明の一実施の形態の構成を示すブロック図である。なお、図1には、この発明を、N個の現用回線40（1）～40（N）と1個の予備回線40（N+1）を有するデータ伝送システムの回線切替え装置に適用する場合を代表として示す。

【0010】図示の回線切替え装置20は、N個のデータ端末装置（DTE）10（1）～10（N）と、（N+1）個の回線終端装置（DCE）30（1）～30（N+1）との間に設けられる。ここで、回線終端装置30（1）～30（N）はそれぞれ現用回線30（1）～30（N）に接続され、回線終端装置30（N+1）は、予備回線40（N+1）に接続されている。

【0011】回線切替え装置20は、N個のDTEチャネル部210（1），210（2），…，210（N）と、（N+1）個のDCEチャネル部220（1），220（2），…，220（N+1）と、回線切替え部230とを有する。

【0012】ここで、各DTEチャネル部210（x）（x＝1，2，…，N）は、各端末装置10（x）ごとに設けられ、対応する端末装置10（x）から出力される送信信号の速度を本来の速度から予め定めた統一速度に変換する機能と、回線切替え部230から供給される受信信号の速度を統一速度から本来の速度に戻す機能とを有する。

【0013】各DCEチャネル部10（y）（y＝1，2，…，N+1）は、各回線終端装置30（y）ごとに設けられ、回線切替え部230から供給される送信信号の伝送速度を統一速度から本来の速度に戻す機能と、対応する回線終端装置30（y）から供給される受信信号の伝送速度を本来の速度から統一速度に変換する機能とを有する。

【0014】回線切替え部230は、回線切替え要求が発生すると、時間スイッチを用いて、使用回線を現用回線40（x）から予備回線40（N+1）に切り替える機能を有する。

【0015】図2は、DTEチャネル部210（x）の構成を示すブロック図である。図示のDTEチャネル部210（x）は、DTEインタフェース回路211（x）と、マッピング回路212（x）と、速度整合回路213（x）とを有する。

【0016】ここで、DTEインタフェース回路211（x）は、マッピング回路212（x）と対応する端末装置10（x）とを接続する機能を有する。

【0017】マッピング回路212（x）は、対応する端末装置10（x）から出力される送信信号を所定のフレームに割り付けることにより、統一速度の整数分の1の中間速度を有する信号を生成する機能と、速度整合回路213（x）から供給される信号のフレームから受信信号を抽出することにより、本来の速度を有する受信信号を得る機能を有する。

【0018】速度整合回路213（x）は、マッピング回路212（x）から供給される信号の伝送速度を中間速度から予め定めた統一速度に変換する機能と、回線切替え部230から供給される信号の伝送速度を統一速度から中間速度に変換する機能を有する。

【0019】図3は、DCEチャネル部220（y）の構成を示すブロック図である。図示のDCEチャネル部220（y）は、速度整合回路221と、マッピング回路222と、ヌルモデム回路223と、DCEインタフェース回路224とを有する。

【0020】速度整合回路221（y）と、マッピング回路222（y）と、DCEインタフェース回路224（y）は、それぞれDTEチャネル部210（x）の速度整合回路213（x）と、マッピング回路212（x）と、DTEインタフェース回路211（x）とほぼ同じような機能を有するので、ここでは、詳細な説明を省略する。ヌルモデム回路223（y）は、JIS X 5101で規定されている信号入れ換え（クロス接続）を行う機能を有する。

【0021】図4は、回線切替え部230の構成を示すブロック図である。図示の回線切替え部230は、第1，第2の時分割多重分離回路231，232と、時間

スイッチ２３３と、操作設定部２３４と、制御部２３５とを有する。

【００２２】ここで、第１の時分割多重分離回路２３１は、ＤＴＥチャネル部２１０（１）～２１０（Ｎ）から供給される送信信号を、１多重周期に現用回線数Ｎと予備回線数１との和（Ｎ＋１）のタイムスロット（時間的位置）数を有するように時分割多重する機能と、時間スイッチ２３３から供給される受信信号の時分割多重信号を各被多重信号ごとに分離し、対応するＤＴＥチャネル部２１０（１）～２１０（Ｎ）に振り分ける機能を有する。

【００２３】第２の時分割多重分離回路２３２は、ＤＣＥチャネル部２２０（１）～２２０（Ｎ）から供給される受信信号を時分割多重する機能と、時間スイッチ２３３から供給される時分割多重信号を各被多重信号ごとに分離し、対応するＤＣＥチャネル部２２０（１）～２２０（Ｎ）に振り分ける機能を有する。

【００２４】時間スイッチ２３３は、第１，第２の時分割多重・分離部２３１，２３２から出力される時分割多重信号のタイムスロットを入れ替えることにより、使用回線を現用回線４０（ｘ）から予備回線４０（Ｎ＋１）に切り替える機能を有する。

【００２５】操作設定部２３４は、回線障害や装置障害により現用回線４０（ｘ）が使用不可能になった場合に、例えば、利用者が回線の切替え要求コマンドを入力するための利用者インタフェースである。

【００２６】制御部２３５は、操作設定部２３４を介して入力された回線切替えコマンドに基づいて、時間スイッチ２３３の動作を制御する機能を有する。

【００２７】［動作］上記構成において、動作を説明する。なお、以下の説明では、この発明を、現用回線４０（１）～４０（Ｎ）や予備回線４０（Ｎ＋１）として、専用回線を用いたデータ伝送システムの回線切替え装置に適用する場合を代表として説明する。

【００２８】このデータ伝送システムでは、信号として、上記のごとく、一般に、ＪＩＳＸ　５１０１で規定される信号が用いられる。この信号としては、送信データ信号ＳＤと、受信データ信号ＲＤと、送信要求信号ＲＳと、送信可信号ＣＳと、受信キャリ検出信号ＣＤとがある。

【００２９】まず、図１を参照しながら、回線切替え装置２０全体の動作を説明する。この動作は、端末装置１０（ｘ）が信号を送信する場合の動作と信号を受信する場合の動作に大別される。

【００３０】まず、端末装置１０（ｘ）が信号を送信する場合の回線切替え装置２０の動作を説明する。

【００３１】この場合、端末装置１０（ｘ）からは、ＪＩＳ　Ｘ　５１０１で規定される送信データ信号ＳＤと送信要求信号ＲＳとからなる直列信号が出力される。この直列信号は、ＤＴＥチャネル部１０（ｘ）により、伝送速度を本来の速度から予め定めた統一速度に変換される。

【００３２】伝送速度を統一速度に変換された直列信号は、現用回線４０（ｘ）が使用可能であれば、回線切替え部２３０を介して現用のＤＣＥチャネル部２２０（ｘ）に供給される。これに対し、現用回線４０（ｘ）が回線障害や装置障害により使用不可能であれば、回線切替え部２３０を介して予備のＤＣＥチャネル部２２０（Ｎ＋１）に供給される。

【００３３】現用のＤＣＥチャネル部２２０（ｘ）あるいは予備のＤＣＥチャネル部２２０（Ｎ＋１）に供給された直列信号は、伝送速度を統一速度から本来の速度に戻される。これにより、ＪＩＳ　Ｘ　５１０１に規定される送信データ信号ＳＤと送信要求信号ＲＳとからなる直列信号が復元される。この直列信号は、現用の回線終端装置３０（ｘ）あるいは予備の回線終端装置３０（Ｎ＋１）を介して現用回線４０（ｘ）あるいは予備回線４０（Ｎ＋１）に送出される。

【００３４】以上が、端末装置１０（ｘ）が信号を送信する場合の回線切替え装置２０の動作である。次に、端末装置１０（ｘ）が信号を受信する場合の回線切替え装置２０の動作を説明する。

【００３５】この場合、端末装置１０（ｘ）の通信相手からは、ＪＩＳ　Ｘ　５１０１で規定される送信信号ＳＤと送信要求信号ＲＳとからなる直列信号が送られてくる。この直列信号は、現用回線４０（ｘ）が使用可能であれば、この現用回線４０（ｘ）を介して送られてくる。これに対し、現用回線４０（ｘ）が使用不可能であれば、予備回線４０（Ｎ＋１）を介して送られてくる。

【００３６】現用回線４０（ｘ）あるいは予備回線４０（Ｎ＋１）を介して送られてきた直列信号は、現用の回線終端装置３０（ｘ）あるいは予備の回線終端装置３０（Ｎ＋１）を介して、現用のＤＣＥチャネル部２２０（ｘ）あるいは予備のＤＣＥチャネル部２２０（Ｎ＋１）に供給される。

【００３７】この場合、送信データ信号ＳＤと送信要求信号ＲＳは、それぞれ受信データ信号ＲＤと受信キャリア検出信号ＣＤとして供給される。また、この場合、信号ＲＤ，ＣＤだけでなく、送信可信号ＣＳもいっしょに供給される。

【００３８】ＤＣＥチャネル部２２０（ｘ）あるいは２２０（Ｎ＋１）に供給された直列信号は、伝送速度を統一速度に変換される。統一速度に変換された直列信号は、回線切替え部２３０を介してＤＴＥチャネル部２１０（ｘ）に供給される。ＤＴＥチャネル部２１０（ｘ）に供給された直列信号は、伝送速度を本来の速度に戻される。これにより、ＪＩＳ　Ｘ　５１０１で規定される受信データ信号ＲＤと、受信キャリア検出信号ＣＤと、送信可信号ＣＳとの直列信号が得られる。この直列信号は、端末装置１０（ｘ）に供給される。

【００３９】以上が端末装置１０（ｘ）が信号を受信する場合の動作である。次に、図2を参照しながら、ＤＴＥチャネル部２１０（ｘ）の動作を説明する。まず、端末装置１０（ｘ）が信号を送信する場合のＤＴＥチャネル部２１０（ｘ）の動作を説明する。

【００４０】この場合、端末装置１０（ｘ）から出力される送信データ信号ＳＤと送信要求信号ＲＳとからなる直列信号は、ＤＣＥチャネル部２１０（ｘ）のＤＴＥインタフェース回路２１１（ｘ）を介してマッピング回路２１２（ｘ）に供給される。

【００４１】マッピング回路２１２（ｘ）に供給された直列信号は、予め定められたフレーム内に割り付けられる。これにより、統一速度の整数分の１の中間速度を有する直列信号が得られる。

【００４２】この速度変換の具体例を図５を参照しながら説明する。ＪＩＳ　Ｘ　５１０１で規定された信号ＳＤ，ＲＳからなる直列信号の本来の速度としては、図５に示すように、０．６Ｋｂ／ｓ，１．２Ｋｂ／ｓ，２．４Ｋｂ／ｓ，４．８Ｋｂ／ｓ，７．２Ｋｂ／ｓ，９．６Ｋｂ／ｓ，１２．０Ｋｂ／ｓ，１４．４Ｋｂ／ｓ，１９．２Ｋｂ／ｓがある。

【００４３】時分割多重用の統一速度を設定するには、この統一速度を上述した複数の本来の速度の公倍数に相当する速度に設定すればよい。しかし、このようにすると、統一速度が非常に大きくなる可能性がある。そこで、この実施の形態では、まず、信号の伝送速度をマッピング処理により中間速度に変換し、次に、この中間速度を統一速度に変換するようになっている。これにより、統一速度が大きくなるのを防止することができる。

【００４４】図５には、マッピング方式として、ＩＴＵ－Ｔ勧告Ｖ．１１０のマッピング方式を採用し、統一速度として、６４Ｋｂ／ｓを採用する場合を示す。

【００４５】この場合、本来の伝送速度０．６Ｋｂ／ｓ，１．２Ｋｂ／ｓ，２．４Ｋｂ／ｓ，４．８Ｋｂ／ｓは、中間速度８Ｋｂ／ｓに変換され、本来の伝送速度７．２Ｋｂ／ｓ，９．６Ｋｂ／ｓは、中間速度１６Ｋｂ／ｓに変換され、本来の伝送速度１２．０Ｋｂ／ｓ，１４．４Ｋｂ／ｓ，１９．２Ｋｂ／ｓは、中間速度３２Ｋｂ／ｓに変換される。

【００４６】図６は、ＩＴＵ－Ｔ勧告Ｖ．１１０のマッピング方式で採用されるフレームの構成を示す。図示のごとく、このフレームは、１０オクテット分のデータを挿入可能となっている。また、このフレームには、フレーム同期を確立するためのフレームビット０，１と、信号ＳＤ，ＲＳをマッピングするためのデータ転送ビットＤｉと、ステータスビットＳｊ，Ｘと、速度表示ビットＥとが設けられている。マッピングに使用されるビットＤｉの数は、信号ＳＤ，ＲＤの本来の速度によって異なる。

【００４７】マッピング回路２１２（ｘ）により中間速度に変換された直列信号は、速度整合回路２１３（ｘ）により統一速度６４Ｋｂ／ｓの直列信号に変換される。この速度変換は、例えば、データ繰返し処理により行われる。この場合、中間速度が、３２Ｋｂ／ｓであれば、データは、例えば、ビット単位で、２回繰り返される。

【００４８】以上が、端末装置１０（ｘ）が信号を送信する場合のＤＴＥチャネル部２１０（ｘ）の動作である。次に、端末装置１０（ｘ）が信号を受信する場合のＤＴＥチャネル部２１０（ｘ）の動作を説明する。

【００４９】この場合、回線切替え部２３０から供給される統一速度の直列信号は、速度整合回路２１３（ｘ）により、中間速度の直列信号に戻される。この速度変換は、例えば、データ間引き処理により行われる。

【００５０】伝送速度を中間速度に変換された直列信号は、マッピング回路２１２（ｘ）に供給され、フレームから信号ＲＤ，ＣＤ，ＣＳを抽出される。これにより、本来の速度を持つ直列信号が得られる。この直列信号は、ＤＴＥインタフェース回路２１０（ｘ）を介して対応する端末装置１０（ｘ）に供給される。

【００５１】以上が、端末装置１０（ｘ）が信号を受信する場合のＤＴＥチャネル部２１０（ｘ）の動作である。次に、図３を参照しながら、ＤＣＥチャネル部２２０（ｘ）の動作を説明する。

【００５２】まず、端末装置１０（ｘ）が信号を送信する場合のＤＣＥチャネル部２２０（ｘ）の動作を説明する。

【００５３】この場合、回線切替え部２３０から出力される統一速度の直列信号は、現用あるいは予備の速度整合回路２２１（ｙ）に供給され、中間速度の直列信号に戻される。この変換出力は、現用あるいは予備のマッピング回路２２２（ｙ）に供給され、フレームから本来の信号ＲＤ，ＣＤを抽出される。これにより、本来の速度を有する直列信号が得られる。

【００５４】この直列信号は、現用あるいは予備のヌルモデム回路２２３（ｙ）に供給され、受信データ信号ＲＤを送信データ信号ＳＤに変換されるとともに、受信キャリア検出信号ＣＤを送信要求信号ＲＳに変換される。これにより、ＪＩＳ　Ｘ　５１０１で規定される信号ＣＤ，ＲＳを持つ直列信号が得られる。この直列信号は、ＤＣＥインタフェース回路２２４（ｙ）を介して現用あるいは予備の回線終端装置３０（ｙ）に送出される。

【００５５】以上が、端末装置１０（ｘ）が信号を送信する場合のＤＣＥチャネル部２２０（ｘ）の動作である。次に、端末装置１０（ｘ）が信号を受信する場合のＤＣＥチャネル部２２０（ｘ）の動作を説明する。

【００５６】この場合、現用あるいは予備の回線終端装置３０（ｙ）から供給される直列信号は、ＤＣＥインタフェース回路２２４（ｙ）と、ヌルモデム回路２２３（ｙ）とを介してマッピング回路２２２（ｙ）に供給され、中間速度の直列信号に変換される。この直列信号

は、速度整合回路２２１（ｙ）により、統一速度の直列信号に変換される。

【００５７】以上が、端末装置１０（ｘ）が信号を受信する場合のＤＣＥチャネル部２２０（ｘ）の動作である。次に、図４を参照しながら、回線切替え部２３０の動作を説明する。

【００５８】まず、端末装置１０（ｘ）が信号を送信する場合の動作を説明する。この場合、ＤＴＥチャネル部２１０（１），２１０（２），…，２１０（Ｎ）から供給されるＮ個の直列信号は、時分割多重分離回路２３１により時分割多重される。この時分割多重は、１多重周期に現用回線数Ｎと予備回線数１との和（Ｎ＋１）のタイムスロットを設定するように行われる。

【００５９】この時分割多重出力は、時間スイッチ２３３に供給され、必要に応じて、現用回線４０（ｘ）と予備回線４０（Ｎ＋１）との間で、被多重信号のタイムスロットを入れ替えられる。

【００６０】すなわち、現用回線４０（ｘ）が使用可能であれば、ＤＴＥチャネル部２１０（ｘ）から出力された直列信号は、この現用回線４０（ｘ）に割り当てれたタイムスロットにそのまま位置決めされる。これに対し、現用回線４０（ｘ）が使用不可能であれば、この直列信号は、予備回線４０（Ｎ＋１）に割り当てれたタイムスロットに位置決めされる。これにより、使用回線が現用回線４０（ｘ）から予備回線４０（Ｎ＋１）に切り替えられる。

【００６１】この回線切替えは、操作設定部２３４を使って利用者により与えられるコマンドに基づいて、制御部２３５によって制御される。

【００６２】時間スイッチ２３３から出力される時分割多重信号は、第２の時分割多重分離回路２３２により各被多重信号ごとに分離され、対応するＤＣＥチャネル部２２０（ｙ）に振り分けられる。これにより、現用回線４０（ｘ）が使用可能である場合は、ＤＴＥチャネル部２１０（ｘ）から出力される直列信号は、現用のＤＣＥチャネル部２２０（ｘ）に供給される。これに対し、現用回線４０（ｘ）が使用不可能である場合は、ＤＴＥチャネル部２１０（ｘ）から出力される直列信号は、予備のＤＣＥチャネル部２２０（Ｎ＋１）に供給される。

【００６３】以上が、端末装置１０（ｘ）が信号を送信する場合の回線切替え部２３０の動作である。次に、端末装置１０（ｘ）が信号を受信する場合の回線切替え部２３０の動作を説明する。

【００６４】この場合も、ＤＣＥチャネル部２２０（１）～２２０（Ｎ＋１）から出力される直列信号は、第２の時分割多重分離回路２３２により時分割多重された後、必要に応じて、時間スイッチ２３３によりタイムスロットを入れ替えられる。この後、時間スイッチ２３３の出力は、第１の時分割多重分離回路２３１により各被多重信号ごとに分離され、ＤＴＥチャネル部２１０（１）～２１０（Ｎ）に振り分けられる。

【００６５】以上が、端末装置１０（ｘ）が信号を受信する場合の回線切替え部２３０の動作である。

【００６６】［効果］以上詳述したこの実施の形態によれば、次のような効果がある。

【００６７】（１）まず、この実施の形態によれば、信号の伝送速度を本来の速度から予め定めた統一速度に変換したり、この速度から本来の速度に戻す機能を設けるようにしたので、時間スイッチ２３３を用いて回線切替えを行うことができる。

【００６８】これにより、チャネル数が多くなったり、複雑な切替え動作を行う必要がある場合にも、回線切替え装置が複雑になることを防止することができる。また、この結果、回線切替え装置そのもののハードウェア障害も問題にならないようにすることができる。

【００６９】（２）また、この実施の形態によれば、信号の伝送速度を統一速度に変換する場合、まず、マッピング処理により中間速度に変換してから統一速度に変換するようにしたので、統一速度が大きくなってしまうことを防止することができる。これにより、速度変換部の構成を簡単にすることができる。

【００７０】［その他の実施の形態］以上、この発明の一実施の形態を詳細に説明したが、この発明は、上述したような実施の形態に限定されるものではない。

【００７１】（１）まず、先の実施の形態では、ＤＴＥチャネル部２１０（１）～２１０（Ｎ）と、ＤＣＥチャネル部２２０（１）～２１０（Ｎ＋１）と、回線切替え部２３０とを一か所に配置する場合を説明した。しかし、この発明では、図７に示すように、これらをそれぞれ離れた場所に配置し、これらの間を伝送回路で接続することにより、離れた場所での回線切替えを行うようにしてもよい。

【００７２】（２）また、先の実施の形態によれば、信号の伝送速度を統一速度に変換する場合、マッピング処理により中間速度に変換してから変換する場合を説明した。しかし、この発明では、統一速度があまり大きくならないような場合には、データ繰返し処理等によって、本来の速度から直接統一速度に変換するようにしてもよい。

【００７３】（３）さらに、先の実施の形態では、予備回線として１つの回線を設けるような回線切替え装置に本発明を適用する場合を説明した。しかし、本発明は、予備回線として、複数の回線を設けるような回線切替え装置にも適用可能である。

【００７４】（４）さらにまた、先の実施の形態では、この発明を、端末装置が送信機能と受信機能を有するデータ伝送システムの回線切替え装置に適用する場合を説明した。しかし、本発明は、端末装置が送信機能あるいは受信機能のみを有するデータ伝送システムの回線切替え装置にも適用可能である。

【００７５】（５）この他にも、この発明は、その要旨を逸脱しない範囲で種々様々変形実施可能なことは勿論である。

【００７６】

【発明の効果】以上詳述したようにこの発明によれば、信号の伝送速度を本来の速度から予め定めた統一速度に変換したり、この速度から本来の速度に戻す機能を設けるようにしたので、時間スイッチを用いて回線切替えを行うことができる。

【００７７】これにより、チャネル数が多くなったり、複雑な切替え動作を行う必要がある場合にも、回線切替え装置が複雑になることを防止することができる。また、この結果、回線切替え装置そのもののハードウェア障害も問題にならないようにすることができる。

【図面の簡単な説明】

【図１】この発明の一実施の形態の構成を示すブロック図である。

【図２】ＤＴＥチャネル部の構成を示すブロック図である。

【図３】ＤＣＥチャネル部の構成を示すブロック図である。

【図４】回線切替え部の構成を示すブロック図である。

【図５】ＤＴＥチャネル部の動作を説明するための図である。

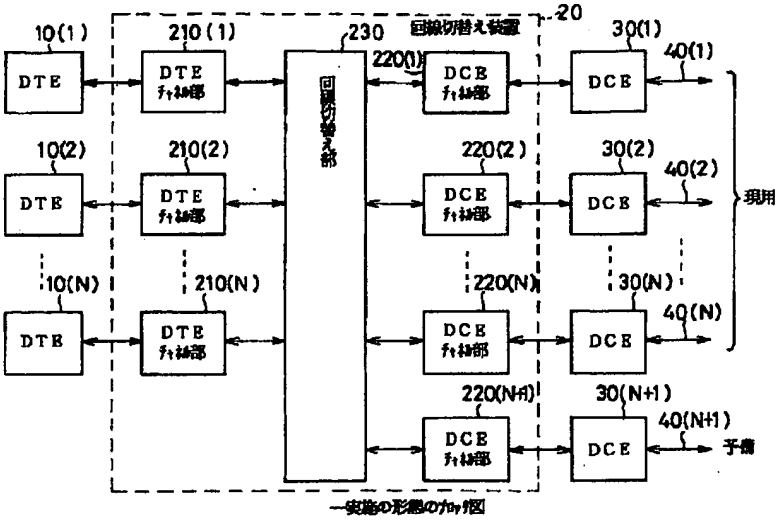
【図６】マッピング用のフレームの構成を示す図である。

【図７】本発明の他の実施の形態の構成を示すブロック図である。

【符号の説明】

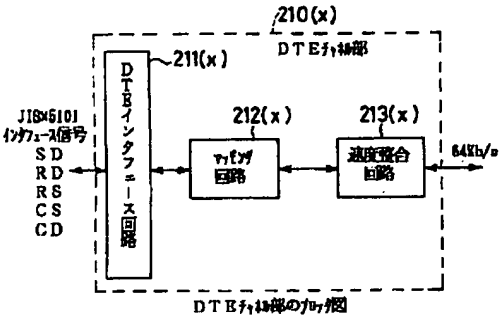
１０（１）～１０（Ｎ）…端末装置
２０…回線切替え装置
３０（１）～３０（Ｎ）…現用の回線終端装置
３０（Ｎ＋１）…予備の回線終端装置
４０（１）～４０（Ｎ）…現用回線
４０（Ｎ＋１）…予備回線
２１０（１）～２１０（Ｎ）…ＤＴＥチャネル部
２２０（１）～２２０（Ｎ＋１）…ＤＣＥチャネル部
２３０…回線切替え部
２１１（ｘ）…ＤＴＥインタフェース回路
２１２（ｘ），２２１（ｙ）…マッピング回路
２１３（ｘ），２２１（ｙ）…速度整合回路
２２３（ｙ）…ヌルモデム回路
２２４（ｙ）…ＤＣＥインタフェース回路
２３１，２３２…時分割多重分離回路
２３３…時間スイッチ
２３４…操作設定部
２３５…制御部

【図１】



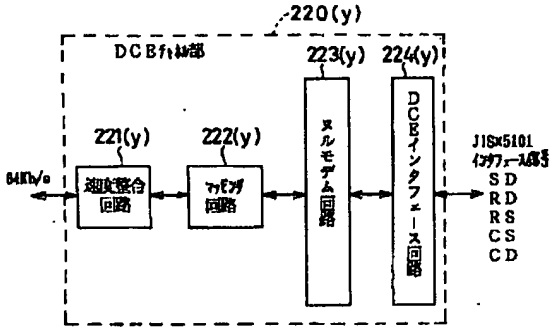
一実施の形態のブロック図

【図2】

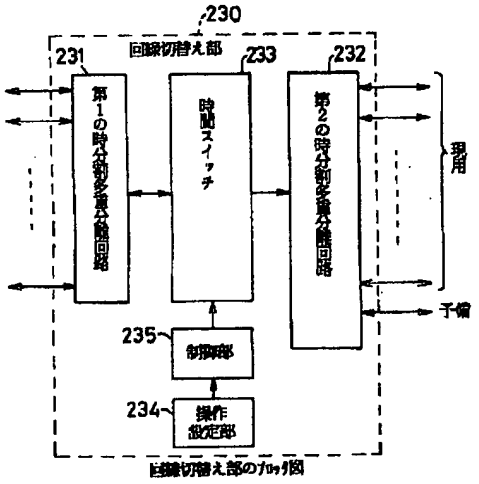


DTEチャネル部のブロック図

【図3】

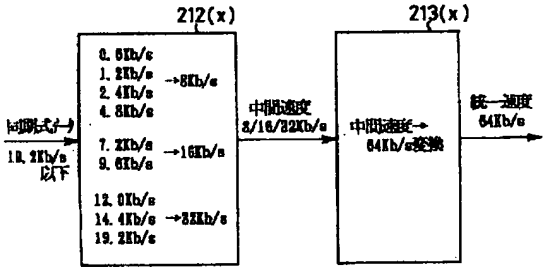


【図4】



回線切替え部のブロック図

【図5】



DTEチャネル部の動作説明図

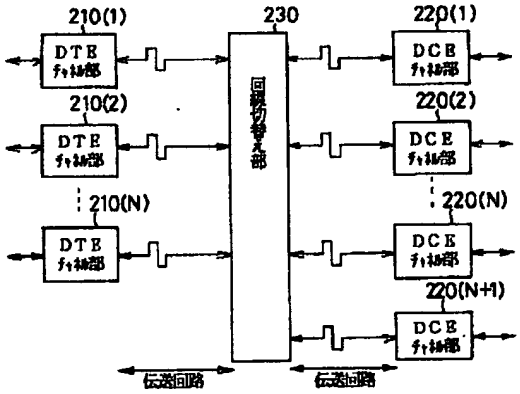
【図6】

オクテット番号	ビット番号							
	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0
1	1	D_1	D_2	D_3	D_4	D_5	D_6	S_1
2	1	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}	X
3	1	D_{13}	D_{14}	D_{15}	D_{16}	D_{17}	D_{18}	S_2
4	1	D_{19}	D_{20}	D_{21}	D_{22}	D_{23}	D_{24}	S_3
5	1	E_1	E_2	E_3	E_4	E_5	E_6	E_7
6	1	D_{25}	D_{26}	D_{27}	D_{28}	D_{29}	D_{30}	S_4
7	1	D_{31}	D_{32}	D_{33}	D_{34}	D_{35}	D_{36}	X
8	1	D_{37}	D_{38}	D_{39}	D_{40}	D_{41}	D_{42}	S_5
9	1	D_{43}	D_{44}	D_{45}	D_{46}	D_{47}	D_{48}	S_6

0, 1 : Pビット(フレーム・ビット)　Si, X : ステータスビット
Di : データ転送用ビット　E : 速度表示ビット

フレーム構成図

【図7】



他の実施の形態のブロック図

フロントページの続き

(51)Int.Cl.[6]	識別記号	庁内整理番号	FI		技術表示箇所
H04Q 11/04	301		H04L 13/00	311	

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **09-238118**

(43)Date of publication of application : **09.09.1997**

(51)Int.Cl. **H04J 3/00**
H04J 3/14
H04L 29/08
H04L 29/14
H04Q 11/04

(21)Application number : **08-042345**

(22)Date of filing : **29.02.1996**

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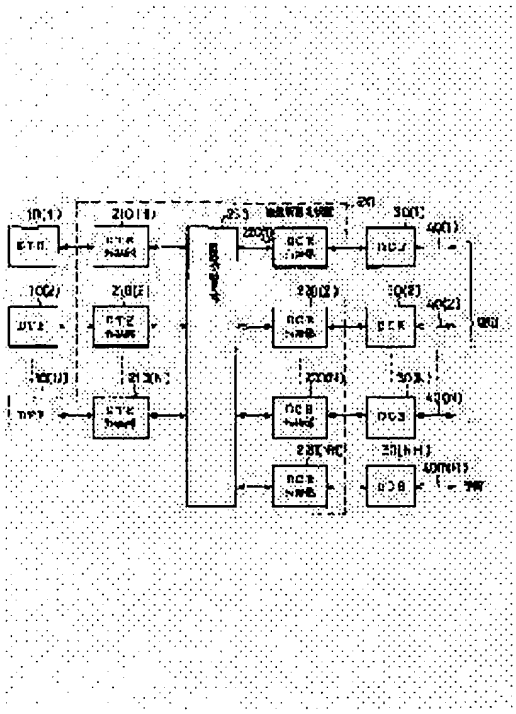
YAMAGUCHI ISOZO

(54) LINE CHANGEOVER DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To attain line changeover by providing a function converting a signal transmission speed into a predetermined unified speed from a substantial speed and restoring the speed to the substantial speed so as to use a time switch.

SOLUTION: In the case of sending a signal by a terminal equipment 10(X) (X=1, 2,..., N), a serial signal consisting of a transmission data signal SD and a transmission request signal RS is outputted. The serial signal is given to a DTE channel section 10(X), in which the transmission speed is converted from a substantial speed into a predetermined unified speed and fed to a DCE channel section 220(X) via a line changeover section 230. When an active line 40(Z) is faulty, the signal is fed to a standby DCE channel section 220(N+1). The supplied serial signal is restored to the substantial speed from the unified speed and the serial signal consisting of the SD and RS is decoded and sent to the active line 40(X) or the standby line 40(N+1) via an active line terminator 30(X) or a standby line terminator 30(N+1). This is similar to receive the signal from the line 40(X) or the line 40(N+1).



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] In the protection switch changed from a circuit to a reserved circuit it uses in common with two or more terminal units with which the transmission speed of a signal differs -- having -- each terminal unit -- present -- business -- if use of a circuit becomes impossible -- the use circuit of this terminal unit -- present -- business -- Two or more speed-conversion means for it to be prepared for every terminal unit and to change the transmission speed of the sending signal outputted from a corresponding terminal unit into the unification rate beforehand defined from the original rate, By carrying out Time Division Multiplexing of the signal outputted from two or more of these speed-conversion means, and replacing the time slot of this Time-Division-Multiplexing output according to the change demand of a circuit a use circuit -- present -- business -- the protection switch characterized by having the circuit change means changed from a circuit to a reserved circuit, and two or more rate inverse transformation means to return the transmission speed of the signal which is established for every circuit and supplied from said circuit change means to said original rate from said unification rate.
[Claim 2] Said speed-conversion means by assigning the sending signal outputted from a corresponding terminal unit to a predetermined frame An allocation means to generate the signal which has the intermediate rate of 1 for an integer of said unification rate, It has a rate adaptation means to change into said unification rate the transmission speed of the signal outputted from this allocation means from said intermediate rate. Said circuit change means The multiplex means which carries out Time Division Multiplexing of the signal outputted from said two or more speed-conversion means so that it may have a time slot for a number of circuit, A time switch means to replace the time slot of the Time-Division-Multiplexing signal outputted from this multiplex means according to the change demand of a circuit, The Time-Division-Multiplexing signal outputted from this time switch means is separated for every **********, and it has a separation means to supply each separation output to a rate inverse transformation means to correspond. Said rate inverse transformation means The protection switch according to claim 1 characterized by having a rate adaptation means to change into said intermediate rate the transmission speed of the signal supplied from said circuit change means from said unification rate, and an extract means to extract said sending signal from the frame of the signal outputted from this rate adaptation means.
[Claim 3] In the protection switch changed from a circuit to a reserved circuit it uses in common with two or more terminal units with which the transmission speed of a signal differs -- having -- each terminal unit -- present -- business -- if use of a circuit becomes impossible -- the use circuit of this terminal unit -- present -- business -- Two or more speed-conversion means for it to be prepared for every circuit and to change the transmission speed of the input signal sent through a corresponding circuit into the unification rate beforehand defined from the original rate, By carrying out Time Division Multiplexing of the signal outputted from two or more of these speed-conversion means, and replacing the time slot of this Time-Division-Multiplexing output according to the change demand of a circuit a use circuit -- present -- business -- the protection switch characterized by having the circuit change means changed from a circuit to a reserved circuit, and two or more rate inverse transformation means to

return the transmission speed of the signal which is established for every terminal unit and supplied from said circuit change means to said original rate from said unification rate.
[Claim 4] Said speed-conversion means by assigning the input signal which was sent through the corresponding circuit and which came to a predetermined frame An allocation means to generate the signal which has the intermediate rate of 1 for an integer of said unification rate, It has a rate adaptation means to change into said unification rate the transmission speed of the signal outputted from this allocation means from said intermediate rate. Said circuit change means The multiplex means which carries out Time Division Multiplexing of the signal outputted from said rate adaptation means of two or more of said speed-conversion means, A time switch means to replace the time slot of the Time-Division-Multiplexing signal outputted from this multiplex means according to the change demand of a circuit, The Time-Division-Multiplexing signal outputted from this time switch means is separated for every **********. It has a separation means to supply each separation output to a rate inverse transformation means to correspond. Said 2nd speed-conversion means The protection switch according to claim 3 characterized by having a rate adaptation means to change into said intermediate rate the transmission speed of the signal supplied from said circuit change means from said unification rate, and an extract means to extract said input signal from the frame of the signal outputted from this rate adaptation means.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] this invention is shared with two or more terminal units with which the transmission speed of a signal differs -- having -- a line failure and device failure -- each terminal unit -- present -- business -- if use of a circuit becomes impossible -- the use circuit of this terminal unit -- present -- business -- it is related with the protection switch changed from a circuit to a reserved circuit.
[0002]
[Description of the Prior Art] the data transmission system generally using the dedicated line -- setting -- present -- business -- everything but a circuit -- a reserved circuit -- preparing -- a line failure and device failure -- present -- business -- if use of a circuit becomes impossible -- a use circuit -- present -- business -- it changes from a circuit to a reserved circuit.
[0003] By the way, in the data transmission system mentioned above, two or more terminal units are usually formed as a terminal unit. Therefore, when preparing a protection switch in this system, to prepare the protection switch shared with all terminal units from a viewpoint of the simplification of circuitry is desired.
[0004] Moreover, it sets to the data transmission system mentioned above, and is usually Japanese Industrial Standards (JIS) as a signal. X The signal specified by 5101 is used. This JIS In X5101, two or more signals with which transmission speed differs are prepared. Therefore, when two or more terminal units exist, the transmission speed of the signal used with each terminal unit may differ. For this reason, when it constitutes the protection switch shared by two or more terminal units, a configuration which can cope with two or more signals with which transmission speed differs is desired.
[0005] In order to meet the above request, the protection switch shared with two or more terminal units using the space switch which consists of space division components, such as a relay, is constituted conventionally.
[0006]
[Problem(s) to be Solved by the Invention] However, with such a configuration, since many space division components were needed in making [many] the number of channels or performing complicated change actuation, there was a problem that a protection switch became complicated. Moreover, thereby, there was a problem of it becoming impossible to disregard the hardware failure of the protection switch itself.
[0007]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is made to perform a circuit change by changing the transmission speed of a signal into the unification rate beforehand defined from the original rate, or preparing the function returned to an original rate from this rate using a time switch.
[0008]
[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained to a detail, referring to a drawing.

[0009] [1 Gestalt of operation]
[Configuration] drawing 1 is the block diagram showing the configuration of the gestalt of 1 implementation of this invention. in addition -- drawing 1 -- this invention -- N individual -- present -- business -- circuit 40 (1) - the case where it applies to the protection switch of the data transmission system which has 40 (N) and one reserved circuit 40 (N+1) is shown as a representative.
[0010] The protection switch 20 of illustration is formed between Data Terminal Equipment (DTE) 10 (1) -10(N) of N individual, and digital circuit access and terminating equipment (DCE) 30(1) -30 (N+1) of an individual (N+1). here -- digital circuit access and terminating equipment 30 (1) - 30 (N) -- respectively -- present -- business -- circuit 30 (1) - it connects with 30 (N) and the digital circuit access and terminating equipment 30 (N+1) is connected to the reserved circuit 40 (N+1).
[0011] A protection switch 20 has the DTE channel section 210 of N individual (1), 210 (2), --, 210 (N) and the DCE channel section 220 (1) of an individual (N+1), 220 (2), --, 220 (N+1) and the circuit change section 230.
[0012] here -- each DTE channel section 210 (x) -- (-- x= -- 1, 2, --, N) -- each terminal unit 10 -- (-- it has the function to change the rate of the sending signal which is prepared in every x) and outputted from the corresponding terminal unit 10 (x) into the unification rate beforehand defined from the original rate, and the function to return the rate of the input signal supplied from the circuit change section 230 to an original rate from a unification rate.
[0013] each DCE channel section 10 (y) -- (-- y= -- 1, 2, --, N+1) -- each digital circuit access and terminating equipment 30 -- (-- it is prepared in every y) and has the function to return the transmission speed of the sending signal supplied from the circuit change section 230 to an original rate from a unification rate, and the function to change into a unification rate the transmission speed of the input signal supplied from the corresponding digital circuit access and terminating equipment 30 (y) from an original rate.
[0014] if a circuit change demand generates the circuit change section 230 -- a time switch -- using -- a use circuit -- present -- business -- it has the function changed from a circuit 40 (x) to a reserved circuit 40 (N+1).
[0015] Drawing 2 is the block diagram showing the configuration of the DTE channel section 210 (x). The DTE channel section 210 of illustration (x) has the DTE interface circuitry 211 (x), and the mapping circuit 212 (x) and the rate adaptation circuit 213 (x).
[0016] Here, the DTE interface circuitry 211 (x) has the function to connect the mapping circuit 212 (x) and the corresponding terminal unit 10 (x).
[0017] The mapping circuit 212 (x) has the function to obtain the input signal which has an original rate, by extracting an input signal from the frame of the function which generates the signal which has the intermediate rate of 1 for an integer of a unification rate, and the signal supplied from the rate adaptation circuit 213 (x) by assigning the sending signal outputted from the corresponding terminal unit 10 (x) to a predetermined frame.
[0018] The rate adaptation circuit 213 (x) has the function to change the transmission speed of the signal supplied from the mapping circuit 212 (x) into the unification rate defined beforehand from an intermediate rate, and the function to change into an intermediate rate the transmission speed of the signal supplied from the circuit change section 230 from a unification rate.
[0019] Drawing 3 is the block diagram showing the configuration of the DCE channel section 220 (y). The DCE channel section 220 of illustration (y) has the rate adaptation circuit 221, the mapping circuit 222, the null modem circuit 223, and the DCE interface circuitry 224.
[0020] Since the rate adaptation circuit 221 (y), and the mapping circuit 222 (y) and the DCE interface circuitry 224 (y) have the respectively almost same function as the rate adaptation circuit 213 (x) of the DTE channel section 210 (x), and the mapping circuit 212 (x) and the DTE interface circuitry 211 (x), they omit detailed explanation here. The null modem circuit 223 (y) is JIS. X It has the function to perform the signal exchange (cross connection) specified by 5101.
[0021] Drawing 4 is the block diagram showing the configuration of the circuit change section 230. The circuit change section 230 of illustration has the 1st and 2nd Time-Division-Multiplexing separation

circuit 231,232, a time switch 233, the actuation setting section 234, and a control section 235.
[0022] Here the 1st Time-Division-Multiplexing separation circuit 231 DTE channel section 210 (1) - the sending signal supplied from 210 (N) -- 1 multiplex period -- present -- business -- with the function which carries out Time Division Multiplexing so that it may have the number of time slots (time location) of the sum (N+1) with a number of circuit N and one reserved circuit The Time-Division-Multiplexing signal of the input signal supplied from a time switch 233 is separated for every **********, and it has the function to distribute to corresponding DTE channel section 210(1) -210(N).
[0023] the 2nd Time-Division-Multiplexing separation circuit 232 -- the DCE channel section 220 (1) - DCE channel section [which separates the function which carries out Time Division Multiplexing of the input signal supplied from 220 (N), and the Time-Division-Multiplexing signal supplied from a time switch 233 for every **********, and corresponds] 220 (1) - it has the function distributed to 220 (N).
[0024] a time switch 233 replaces the time slot of the Time-Division-Multiplexing signal outputted from the 1st and 2nd Time Division Multiplexing and separation section 231,232 -- a use circuit -- present -- business -- it has the function changed from a circuit 40 (x) to a reserved circuit 40 (N+1).
[0025] the actuation setting section 234 -- a line failure and device failure -- present -- business -- it is a user interface for a user to input the change demand command of a circuit, when a circuit 40 (x) becomes unusable.
[0026] A control section 235 has the function which controls actuation of a time switch 233 based on the circuit change command inputted through the actuation setting section 234.
[0027] [Operation] -- actuation is explained in the account configuration of a top. in addition -- the following explanation -- this invention -- present -- business -- circuit 40 (1) - the case where it applies to the protection switch of the data transmission system using the dedicated line as 40 (N) and a reserved circuit 40 (N+1) is explained as a representative.
[0028] Generally with this data transmission system, it is JISX like the above as a signal. The signal specified by 5101 is used. As this signal, there are the transmit data signal SD, the received-data signal RD, the Request-to-Send signal RS, the ready-for-sending signal CS, and a receiving carry detecting signal CD.
[0029] First, actuation of the protection switch 20 whole is explained, referring to drawing 1 . This actuation is divided roughly into the actuation in the case of receiving actuation in case a terminal unit 10 (x) transmits a signal, and a signal.
[0030] First, actuation of the protection switch 20 in case a terminal unit 10 (x) transmits a signal is explained.
[0031] In this case, from a terminal unit 10 (x), it is JIS. X The serial signal which consists of a transmit data signal SD specified by 5101 and a Request-to-Send signal RS is outputted. This serial signal is changed into the unification rate which defined transmission speed beforehand from the original rate by the DTE channel section 10 (x).
[0032] the serial signal into which transmission speed was changed by the unification rate -- present -- business -- if the circuit 40 (x) is usable -- the circuit change section 230 -- minding -- present -- the DCE channel section 220 of business (x) is supplied. on the other hand -- present -- business -- if the circuit 40 (x) is unusable, it will be supplied to the spare DCE channel section 220 (N+1) by a line failure and device failure through the circuit change section 230.
[0033] present -- transmission speed is returned to the serial signal supplied to the DCE channel section 220 of business (x), or the spare DCE channel section 220 (N+1) by the original rate from a unification rate. Thereby, it is JIS. X The serial signal which consists of a transmit data signal SD specified to 5101 and a Request-to-Send signal RS is restored. this serial signal -- present -- the digital circuit access and terminating equipment 30 of business (x), or the spare digital circuit access and terminating equipment 30 (N+1) -- minding -- present -- business -- it is sent out to a circuit 40 (x) or a reserved circuit 40 (N+1).
[0034] The above is actuation of the protection switch 20 in case a terminal unit 10 (x) transmits a signal. Next, actuation of the protection switch 20 in case a terminal unit 10 (x) receives a signal is explained.

[0035] In this case, from the communications partner of a terminal unit 10 (x), it is JIS. X The serial signal which consists of a sending signal SD specified by 5101 and a Request-to-Send signal RS is sent. this serial signal -- present -- business -- if the circuit 40 (x) is usable -- this -- present -- business -- it is sent through a circuit 40 (x). on the other hand -- present -- business -- if the circuit 40 (x) is unusable, it will be sent through a reserved circuit 40 (N+1).
[0036] present -- business -- the serial signal sent through a circuit 40 (x) or a reserved circuit 40 (N+1) -- present -- the digital circuit access and terminating equipment 30 of business (x), or the spare digital circuit access and terminating equipment 30 (N+1) -- minding -- present -- the DCE channel section 220 of business (x) or the spare DCE channel section 220 (N+1) is supplied.
[0037] In this case, the transmit data signal SD and the Request-to-Send signal RS are supplied as the received-data signal RD and a receiving Carrier Detect signal CD, respectively. Moreover, not only the signals RD and CD but the ready-for-sending signal CS is supplied together in this case.
[0038] Transmission speed is changed into the serial signal supplied to the DCE channel section 220 (x) or 220 (N+1) by the unification rate. The serial signal changed into the unification rate is supplied to the DTE channel section 210 (x) through the circuit change section 230. Transmission speed is returned to the serial signal supplied to the DTE channel section 210 (x) by the original rate. Thereby, it is JIS. X The serial signal of the received-data signal RD and the receiving Carrier Detect signal CD which are specified by 5101, and the ready-for-sending signal CS is acquired. This serial signal is supplied to a terminal unit 10 (x).
[0039] The above is [a terminal unit 10 (x)] actuation in the case of receiving a signal. Next, actuation of the DTE channel section 210 (x) is explained, referring to drawing 2 . First, actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) transmits a signal is explained.
[0040] In this case, the serial signal which consists of a transmit data signal SD outputted from a terminal unit 10 (x) and a Request-to-Send signal RS is supplied to the mapping circuit 212 (x) through the DTE interface circuitry 211 (x) of the DCE channel section 210 (x).
[0041] The serial signal supplied to the mapping circuit 212 (x) is assigned in the frame defined beforehand. Thereby, the serial signal which has the intermediate rate of 1 for an integer of a unification rate is acquired.
[0042] The example of this speed conversion is explained referring to drawing 5 . JIS X As an original rate of the serial signal which consists of signals SD and RS specified by 5101, as shown in drawing 5 , there are 0.6 Kb/s, 1.2 Kb/s, 2.4 Kb/s, 4.8 Kb/s, 7.2 Kb/s, 9.6 Kb/s, 12.0 Kb/s, 14.4 Kb/s, and 19.2 Kb/s.
[0043] What is necessary is just to set it as the rate equivalent to the common multiple of two or more original rates which mentioned this unification rate above, in order to set up the unification rate for Time Division Multiplexing. However, a unification rate may become very large if it does in this way. So, with the gestalt of this operation, first, the transmission speed of a signal is changed into an intermediate rate by mapping processing, next this intermediate rate is changed into a unification rate. Thereby, it can prevent that a unification rate becomes large.
[0044] As a mapping mode, the mapping mode of ITU-T recommendation V.110 is adopted as drawing 5 , and the case where 64 Kb/s is adopted is shown in it as a unification rate.
[0045] In this case, original transmission-speed 0.6 Kb/s, 1.2 Kb/s, 2.4 Kb/s, and 4.8 Kb/s are changed into intermediate-rate 8 Kb/s, original transmission-speed 7.2 Kb/s and 9.6 Kb/s are changed into intermediate-rate 16 Kb/s, and original transmission-speed 12.0 Kb/s, 14.4 Kb/s, and 19.2 Kb/s are changed into intermediate-rate 32 Kb/s.
[0046] Drawing 6 shows the configuration of the frame adopted with the mapping mode of ITU-T recommendation V.110. Like illustration, this frame can insert the data for ten octets. Moreover, the framing bits 0 and 1 for establishing frame synchronization, the data transfer bit Di for mapping Signals SD and RS, status bits Sj and X, and the rate display bit E are formed in this frame. The number of the bits Di used for mapping changes with original rates of Signals SD and RD.
[0047] The serial signal changed into the intermediate rate by the mapping circuit 212 (x) is changed into the serial signal of unification rate 64 Kb/s by the rate adaptation circuit 213 (x). This speed conversion is performed by for example, data repetitive operation. In this case, if an intermediate rate is

32 Kb/s, data will be bitwise and will be repeated twice.
[0048] The above is actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) transmits a signal. Next, actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) receives a signal is explained.
[0049] In this case, the serial signal of the unification rate supplied from the circuit change section 230 is returned to the serial signal of an intermediate rate by the rate adaptation circuit 213 (x). This speed conversion is performed by for example, data infanticide processing.
[0050] The serial signal into which transmission speed was changed by the intermediate rate is supplied to the mapping circuit 212 (x), and Signals RD, CD, and CS are extracted from it from a frame. Thereby, a serial signal with an original rate is acquired. This serial signal is supplied to the terminal unit 10 (x) which corresponds through the DTE interface circuitry 210 (x).
[0051] The above is actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) receives a signal. Next, actuation of the DCE channel section 220 (x) is explained, referring to drawing 3 .
[0052] First, actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) transmits a signal is explained.
[0053] in this case, the serial signal of the unification rate outputted from the circuit change section 230 -- present -- business or the spare rate adaptation circuit 221 (y) is supplied, and it is returned to the serial signal of an intermediate rate. this conversion output -- present -- business or the spare mapping circuit 222 (y) is supplied, and the original signals RD and CD are extracted from a frame. Thereby, the serial signal which has an original rate is acquired.
[0054] this serial signal -- present -- while business or the spare null modem circuit 223 (y) is supplied and the received-data signal RD is changed by the transmit data signal SD, the receiving Carrier Detect signal CD is changed by the Request-to-Send signal RS. Thereby, it is JIS. X A serial signal with the signals CD and RS specified by 5101 is acquired. this serial signal -- the DCE interface circuitry 224 (y) -- minding -- present -- it is sent out to the digital circuit access and terminating equipment 30 of business or a reserve (y).
[0055] The above is actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) transmits a signal. Next, actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) receives a signal is explained.
[0056] in this case -- present -- the serial signal supplied from the digital circuit access and terminating equipment 30 of business or a reserve (y) is supplied to the mapping circuit 222 (y) through the DCE interface circuitry 224 (y) and the null modem circuit 223 (y), and is changed into the serial signal of an intermediate rate. This serial signal is changed into the serial signal of a unification rate by the rate adaptation circuit 221 (y).
[0057] The above is actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) receives a signal. Next, actuation of the circuit change section 230 is explained, referring to drawing 4 .
[0058] First, actuation in case a terminal unit 10 (x) transmits a signal is explained. In this case, Time Division Multiplexing of the serial signal of the DTE channel section 210 (1), 210 (2), --, N individual supplied from 210 (N) is carried out by the Time-Division-Multiplexing separation circuit 231. this Time Division Multiplexing -- 1 multiplex period -- present -- business -- it is carried out so that the time slot of the sum (N+1) with a number of circuit N and one reserved circuit may be set up.
[0059] this Time-Division-Multiplexing output is supplied to a time switch 233 -- having -- the need -- responding -- present -- business -- the time slot of a multiple signal-ed can be replaced between a circuit 40 (x) and a reserved circuit 40 (N+1).
[0060] namely, -- present -- business -- the serial signal outputted from the DTE channel section 210 (x) when the circuit 40 (x) was usable -- this -- present -- business -- it assigns a circuit 40 (x) and is positioned as it is by the **** time slot. on the other hand -- present -- business -- if the circuit 40 (x) is unusable, this serial signal will be assigned to a reserved circuit 40 (N+1), and will be positioned by the **** time slot. thereby -- a use circuit -- present -- business -- it changes from a circuit 40 (x) to a reserved circuit 40 (N+1).
[0061] This circuit change is controlled by the control section 235 based on the command given by the

user using the actuation setting section 234.
[0062] The 2nd Time-Division-Multiplexing separation circuit 232 dissociates for every **********, and the Time-Division-Multiplexing signal outputted from a time switch 233 can be distributed to the corresponding DCE channel section 220 (y). thereby -- present -- business -- the serial signal with which a circuit 40 (x) is outputted from the DTE channel section 210 (x) when usable -- present -- the DCE channel section 220 of business (x) is supplied. on the other hand -- present -- business -- the serial signal with which a circuit 40 (x) is outputted from the DTE channel section 210 (x) when unusable is supplied to the spare DCE channel section 220 (N+1).
[0063] The above is actuation of the circuit change section 230 in case a terminal unit 10 (x) transmits a signal. Next, actuation of the circuit change section 230 in case a terminal unit 10 (x) receives a signal is explained.
[0064] After Time Division Multiplexing of the serial signal outputted also in this case from DCE channel section 220(1) -220 (N+1) is carried out by the 2nd Time-Division-Multiplexing separation circuit 232, it has a time slot replaced by the time switch 233 if needed. Then, the 1st Time-Division-Multiplexing separation circuit 231 dissociates for every **********, and the output of a time switch 233 can be distributed to DTE channel section 210(1) -210(N).
[0065] The above is actuation of the circuit change section 230 in case a terminal unit 10 (x) receives a signal.
[0066] [Effect] -- according to the gestalt of this operation explained in full detail above, there is the following effectiveness.
[0067] (1) Since the transmission speed of a signal was changed into the unification rate beforehand defined from the original rate or the function returned to an original rate from this rate was first prepared according to the gestalt of this operation, a circuit change can be performed using a time switch 233.
[0068] Also when the number of channels needs to increase or complicated change actuation needs to be performed by this, it can prevent that a protection switch becomes complicated. Moreover, the hardware failure of the protection switch itself can also be prevented from as a result becoming a problem.
[0069] (2) Moreover, since it was made according to the gestalt of this operation to change into a unification rate first when the transmission speed of a signal is changed into a unification rate after changing into the intermediate rate by mapping processing, it can prevent that a unification rate becomes large. Thereby, the configuration of the speed-conversion section can be simplified.
[0070] Although the gestalt of 1 implementation of this invention was explained to the detail beyond the [gestalt of other operations], this invention is not limited to a gestalt of operation which was mentioned above.
[0071] (1) The gestalt of previous operation first explained the case where DTE channel section 210(1) -210(N), DCE channel section 220(1) -210 (N+1), and the circuit change section 230 were arranged to one place. However, in this invention, as shown in drawing 7 , it may be made to perform a circuit change in the distant location by arranging in the location which left these, respectively and connecting between these by the propagation circuit.
[0072] (2) Moreover, according to the gestalt of previous operation, when the transmission speed of a signal was changed into a unification rate, the case where it changed after changing into an intermediate rate by mapping processing was explained. However, when a unification rate does not become not much large, you may make it change into a direct unification rate from an original rate by data repetitive operation etc. in this invention.
[0073] (3) The gestalt of previous operation explained further the case where this invention was applied to a protection switch which prepares one circuit as a reserved circuit. However, this invention is applicable also to a protection switch which prepares two or more circuits as a reserved circuit.
[0074] (4) The gestalt of previous operation explained the case where a terminal unit applied this invention to the protection switch of the data transmission system which has a transmitting function and a reception function further again. However, a terminal unit can apply this invention also to the protection switch of the data transmission system which has only a transmitting function or a reception function.

[0075] (5) In addition, this invention of various deformation implementation being variously possible in the range which does not deviate from that summary is natural.
[0076]
[Effect of the Invention] Since according to this invention the transmission speed of a signal was changed into the unification rate beforehand defined from the original rate or the function returned to an original rate from this rate was prepared as explained in full detail above, a circuit change can be performed using a time switch.
[0077] Also when the number of channels needs to increase or complicated change actuation needs to be performed by this, it can prevent that a protection switch becomes complicated. Moreover, the hardware failure of the protection switch itself can also be prevented from as a result becoming a problem.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] this invention is shared with two or more terminal units with which the transmission speed of a signal differs -- having -- a line failure and device failure -- each terminal unit -- present -- business -- if use of a circuit becomes impossible -- the use circuit of this terminal unit -- present -- business -- it is related with the protection switch changed from a circuit to a reserved circuit.

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PRIOR ART

[Description of the Prior Art] the data transmission system generally using the dedicated line -- setting -- present -- business -- everything but a circuit -- a reserved circuit -- preparing -- a line failure and device failure -- present -- business -- if use of a circuit becomes impossible -- a use circuit -- present -- business -- it changes from a circuit to a reserved circuit.
[0003] By the way, in the data transmission system mentioned above, two or more terminal units are usually formed as a terminal unit. Therefore, when preparing a protection switch in this system, to prepare the protection switch shared with all terminal units from a viewpoint of the simplification of circuitry is desired.
[0004] Moreover, it sets to the data transmission system mentioned above, and is usually Japanese Industrial Standards (JIS) as a signal. X The signal specified by 5101 is used. This JIS In X5101, two or more signals with which transmission speed differs are prepared. Therefore, when two or more terminal units exist, the transmission speed of the signal used with each terminal unit may differ. For this reason, when it constitutes the protection switch shared by two or more terminal units, a configuration which can cope with two or more signals with which transmission speed differs is desired.
[0005] In order to meet the above request, the protection switch shared with two or more terminal units using the space switch which consists of space division components, such as a relay, is constituted conventionally.

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EFFECT OF THE INVENTION

[Effect] -- according to the gestalt of this operation explained in full detail above, there is the following effectiveness.
[0067] (1) Since the transmission speed of a signal was changed into the unification rate beforehand defined from the original rate or the function returned to an original rate from this rate was first prepared according to the gestalt of this operation, a circuit change can be performed using a time switch 233.
[0068] Also when the number of channels needs to increase or complicated change actuation needs to be performed by this, it can prevent that a protection switch becomes complicated. Moreover, the hardware failure of the protection switch itself can also be prevented from as a result becoming a problem.
[0069] (2) Moreover, since it was made according to the gestalt of this operation to change into a unification rate first when the transmission speed of a signal is changed into a unification rate after changing into the intermediate rate by mapping processing, it can prevent that a unification rate becomes large. Thereby, the configuration of the speed-conversion section can be simplified.
[0070] Although the gestalt of 1 implementation of this invention was explained to the detail beyond the [gestalt of other operations], this invention is not limited to a gestalt of operation which was mentioned above.
[0071] (1) The gestalt of previous operation first explained the case where DTE channel section 210(1) - 210(N), DCE channel section 220(1) -210 (N+1), and the circuit change section 230 were arranged to one place. However, in this invention, as shown in drawing 7 , it may be made to perform a circuit change in the distant location by arranging in the location which left these, respectively and connecting between these by the propagation circuit.
[0072] (2) Moreover, according to the gestalt of previous operation, when the transmission speed of a signal was changed into a unification rate, the case where it changed after changing into an intermediate rate by mapping processing was explained. However, when a unification rate does not become not much large, you may make it change into a direct unification rate from an original rate by data repetitive operation etc. in this invention.
[0073] (3) The gestalt of previous operation explained further the case where this invention was applied to a protection switch which prepares one circuit as a reserved circuit. However, this invention is applicable also to a protection switch which prepares two or more circuits as a reserved circuit.
[0074] (4) The gestalt of previous operation explained the case where a terminal unit applied this invention to the protection switch of the data transmission system which has a transmitting function and a reception function further again. However, a terminal unit can apply this invention also to the protection switch of the data transmission system which has only a transmitting function or a reception function.
[0075] (5) In addition, this invention of various deformation implementation being variously possible in the range which does not deviate from that summary is natural.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, with such a configuration, since many space division components were needed in making [many] the number of channels or performing complicated change actuation, there was a problem that a protection switch became complicated. Moreover, thereby, there was a problem of it becoming impossible to disregard the hardware failure of the protection switch itself.

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is made to perform a circuit change by changing the transmission speed of a signal into the unification rate beforehand defined from the original rate, or preparing the function returned to an original rate from this rate using a time switch.
[0008]
[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained to a detail, referring to a drawing.
[0009] [1 Gestalt of operation]
[Configuration] drawing 1 is the block diagram showing the configuration of the gestalt of 1 implementation of this invention. in addition -- drawing 1 -- this invention -- N individual -- present -- business -- circuit 40 (1) - the case where it applies to the protection switch of the data transmission system which has 40 (N) and one reserved circuit 40 (N+1) is shown as a representative.
[0010] The protection switch 20 of illustration is formed between Data Terminal Equipment (DTE) 10 (1) -10(N) of N individual, and digital circuit access and terminating equipment (DCE) 30(1) -30 (N+1) of an individual (N+1). here -- digital circuit access and terminating equipment 30 (1) - 30 (N) -- respectively -- present -- business -- circuit 30 (1) - it connects with 30 (N) and the digital circuit access and terminating equipment 30 (N+1) is connected to the reserved circuit 40 (N+1).
[0011] A protection switch 20 has the DTE channel section 210 of N individual (1), 210 (2), --, 210 (N) and the DCE channel section 220 (1) of an individual (N+1), 220 (2), --, 220 (N+1) and the circuit change section 230.
[0012] here -- each DTE channel section 210 (x) -- (-- x= -- 1, 2, --, N) -- each terminal unit 10 -- (-- it has the function to change the rate of the sending signal which is prepared in every x) and outputted from the corresponding terminal unit 10 (x) into the unification rate beforehand defined from the original rate, and the function to return the rate of the input signal supplied from the circuit change section 230 to an original rate from a unification rate.
[0013] each DCE channel section 10 (y) -- (-- y= -- 1, 2, --, N+1) -- each digital circuit access and terminating equipment 30 -- (-- it is prepared in every y) and has the function to return the transmission speed of the sending signal supplied from the circuit change section 230 to an original rate from a unification rate, and the function to change into a unification rate the transmission speed of the input signal supplied from the corresponding digital circuit access and terminating equipment 30 (y) from an original rate.
[0014] if a circuit change demand generates the circuit change section 230 -- a time switch -- using -- a use circuit -- present -- business -- it has the function changed from a circuit 40 (x) to a reserved circuit 40 (N+1).
[0015] Drawing 2 is the block diagram showing the configuration of the DTE channel section 210 (x). The DTE channel section 210 of illustration (x) has the DTE interface circuitry 211 (x), and the mapping circuit 212 (x) and the rate adaptation circuit 213 (x).
[0016] Here, the DTE interface circuitry 211 (x) has the function to connect the mapping circuit 212 (x)

and the corresponding terminal unit 10 (x).
[0017] The mapping circuit 212 (x) has the function to obtain the input signal which has an original rate, by extracting an input signal from the frame of the function which generates the signal which has the intermediate rate of 1 for an integer of a unification rate, and the signal supplied from the rate adaptation circuit 213 (x) by assigning the sending signal outputted from the corresponding terminal unit 10 (x) to a predetermined frame.
[0018] The rate adaptation circuit 213 (x) has the function to change the transmission speed of the signal supplied from the mapping circuit 212 (x) into the unification rate defined beforehand from an intermediate rate, and the function to change into an intermediate rate the transmission speed of the signal supplied from the circuit change section 230 from a unification rate.
[0019] Drawing 3 is the block diagram showing the configuration of the DCE channel section 220 (y). The DCE channel section 220 of illustration (y) has the rate adaptation circuit 221, the mapping circuit 222, the null modem circuit 223, and the DCE interface circuitry 224.
[0020] Since the rate adaptation circuit 221 (y), and the mapping circuit 222 (y) and the DCE interface circuitry 224 (y) have the respectively almost same function as the rate adaptation circuit 213 (x) of the DTE channel section 210 (x), and the mapping circuit 212 (x) and the DTE interface circuitry 211 (x), they omit detailed explanation here. The null modem circuit 223 (y) is JIS. X It has the function to perform the signal exchange (cross connection) specified by 5101.
[0021] Drawing 4 is the block diagram showing the configuration of the circuit change section 230. The circuit change section 230 of illustration has the 1st and 2nd Time-Division-Multiplexing separation circuit 231,232, a time switch 233, the actuation setting section 234, and a control section 235.
[0022] Here the 1st Time-Division-Multiplexing separation circuit 231 DTE channel section 210 (1) - the sending signal supplied from 210 (N) -- 1 multiplex period -- present -- business -- with the function which carries out Time Division Multiplexing so that it may have the number of time slots (time location) of the sum (N+1) with a number of circuit N and one reserved circuit The Time-Division-Multiplexing signal of the input signal supplied from a time switch 233 is separated for every **********, and it has the function to distribute to corresponding DTE channel section 210(1) -210(N).
[0023] the 2nd Time-Division-Multiplexing separation circuit 232 -- the DCE channel section 220 (1) - DCE channel section [which separates the function which carries out Time Division Multiplexing of the input signal supplied from 220 (N), and the Time-Division-Multiplexing signal supplied from a time switch 233 for every **********, and corresponds] 220 (1) - it has the function distributed to 220 (N).
[0024] a time switch 233 replaces the time slot of the Time-Division-Multiplexing signal outputted from the 1st and 2nd Time Division Multiplexing and separation section 231,232 -- a use circuit -- present -- business -- it has the function changed from a circuit 40 (x) to a reserved circuit 40 (N+1).
[0025] the actuation setting section 234 -- a line failure and device failure -- present -- business -- it is a user interface for a user to input the change demand command of a circuit, when a circuit 40 (x) becomes unusable.
[0026] A control section 235 has the function which controls actuation of a time switch 233 based on the circuit change command inputted through the actuation setting section 234.
[0027] [Operation] -- actuation is explained in the account configuration of a top. in addition -- the following explanation -- this invention -- present -- business -- circuit 40 (1) - the case where it applies to the protection switch of the data transmission system using the dedicated line as 40 (N) and a reserved circuit 40 (N+1) is explained as a representative.
[0028] Generally with this data transmission system, it is JISX like the above as a signal. The signal specified by 5101 is used. As this signal, there are the transmit data signal SD, the received-data signal RD, the Request-to-Send signal RS, the ready-for-sending signal CS, and a receiving carry detecting signal CD.
[0029] First, actuation of the protection switch 20 whole is explained, referring to drawing 1 . This actuation is divided roughly into the actuation in the case of receiving actuation in case a terminal unit 10 (x) transmits a signal, and a signal.
[0030] First, actuation of the protection switch 20 in case a terminal unit 10 (x) transmits a signal is

explained.
[0031] In this case, from a terminal unit 10 (x), it is JIS. X The serial signal which consists of a transmit data signal SD specified by 5101 and a Request-to-Send signal RS is outputted. This serial signal is changed into the unification rate which defined transmission speed beforehand from the original rate by the DTE channel section 10 (x).
[0032] the serial signal into which transmission speed was changed by the unification rate -- present -- business -- if the circuit 40 (x) is usable -- the circuit change section 230 -- minding -- present -- the DCE channel section 220 of business (x) is supplied. on the other hand -- present -- business -- if the circuit 40 (x) is unusable, it will be supplied to the spare DCE channel section 220 (N+1) by a line failure and device failure through the circuit change section 230.
[0033] present -- transmission speed is returned to the serial signal supplied to the DCE channel section 220 of business (x), or the spare DCE channel section 220 (N+1) by the original rate from a unification rate. Thereby, it is JIS. X The serial signal which consists of a transmit data signal SD specified to 5101 and a Request-to-Send signal RS is restored. this serial signal -- present -- the digital circuit access and terminating equipment 30 of business (x), or the spare digital circuit access and terminating equipment 30 (N+1) -- minding -- present -- business -- it is sent out to a circuit 40 (x) or a reserved circuit 40 (N+1).
[0034] The above is actuation of the protection switch 20 in case a terminal unit 10 (x) transmits a signal. Next, actuation of the protection switch 20 in case a terminal unit 10 (x) receives a signal is explained.
[0035] In this case, from the communications partner of a terminal unit 10 (x), it is JIS. X The serial signal which consists of a sending signal SD specified by 5101 and a Request-to-Send signal RS is sent. this serial signal -- present -- business -- if the circuit 40 (x) is usable -- this -- present -- business -- it is sent through a circuit 40 (x). on the other hand -- present -- business -- if the circuit 40 (x) is unusable, it will be sent through a reserved circuit 40 (N+1).
[0036] present -- business -- the serial signal sent through a circuit 40 (x) or a reserved circuit 40 (N+1) -- present -- the digital circuit access and terminating equipment 30 of business (x), or the spare digital circuit access and terminating equipment 30 (N+1) -- minding -- present -- the DCE channel section 220 of business (x) or the spare DCE channel section 220 (N+1) is supplied.
[0037] In this case, the transmit data signal SD and the Request-to-Send signal RS are supplied as the received-data signal RD and a receiving Carrier Detect signal CD, respectively. Moreover, not only the signals RD and CD but the ready-for-sending signal CS is supplied together in this case.
[0038] Transmission speed is changed into the serial signal supplied to the DCE channel section 220 (x) or 220 (N+1) by the unification rate. The serial signal changed into the unification rate is supplied to the DTE channel section 210 (x) through the circuit change section 230. Transmission speed is returned to the serial signal supplied to the DTE channel section 210 (x) by the original rate. Thereby, it is JIS. X The serial signal of the received-data signal RD and the receiving Carrier Detect signal CD which are specified by 5101, and the ready-for-sending signal CS is acquired. This serial signal is supplied to a terminal unit 10 (x).
[0039] The above is [a terminal unit 10 (x)] actuation in the case of receiving a signal. Next, actuation of the DTE channel section 210 (x) is explained, referring to drawing 2 . First, actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) transmits a signal is explained.
[0040] In this case, the serial signal which consists of a transmit data signal SD outputted from a terminal unit 10 (x) and a Request-to-Send signal RS is supplied to the mapping circuit 212 (x) through the DTE interface circuitry 211 (x) of the DCE channel section 210 (x).
[0041] The serial signal supplied to the mapping circuit 212 (x) is assigned in the frame defined beforehand. Thereby, the serial signal which has the intermediate rate of 1 for an integer of a unification rate is acquired.
[0042] The example of this speed conversion is explained referring to drawing 5 . JIS X As an original rate of the serial signal which consists of signals SD and RS specified by 5101, as shown in drawing 5 , there are 0.6 Kb/s, 1.2 Kb/s, 2.4 Kb/s, 4.8 Kb/s, 7.2 Kb/s, 9.6 Kb/s, 12.0 Kb/s, 14.4 Kb/s, and 19.2 Kb/s.

[0043] What is necessary is just to set it as the rate equivalent to the common multiple of two or more original rates which mentioned this unification rate above, in order to set up the unification rate for Time Division Multiplexing. However, a unification rate may become very large if it does in this way. So, with the gestalt of this operation, first, the transmission speed of a signal is changed into an intermediate rate by mapping processing, next this intermediate rate is changed into a unification rate. Thereby, it can prevent that a unification rate becomes large.
[0044] As a mapping mode, the mapping mode of ITU-T recommendation V.110 is adopted as drawing 5 , and the case where 64 Kb/s is adopted is shown in it as a unification rate.
[0045] In this case, original transmission-speed 0.6 Kb/s, 1.2 Kb/s, 2.4 Kb/s, and 4.8 Kb/s are changed into intermediate-rate 8 Kb/s, original transmission-speed 7.2 Kb/s and 9.6 Kb/s are changed into intermediate-rate 16 Kb/s, and original transmission-speed 12.0 Kb/s, 14.4 Kb/s, and 19.2 Kb/s are changed into intermediate-rate 32 Kb/s.
[0046] Drawing 6 shows the configuration of the frame adopted with the mapping mode of ITU-T recommendation V.110. Like illustration, this frame can insert the data for ten octets. Moreover, the framing bits 0 and 1 for establishing frame synchronization, the data transfer bit Di for mapping Signals SD and RS, status bits Sj and X, and the rate display bit E are formed in this frame. The number of the bits Di used for mapping changes with original rates of Signals SD and RD.
[0047] The serial signal changed into the intermediate rate by the mapping circuit 212 (x) is changed into the serial signal of unification rate 64 Kb/s by the rate adaptation circuit 213 (x). This speed conversion is performed by for example, data repetitive operation. In this case, if an intermediate rate is 32 Kb/s, data will be bitwise and will be repeated twice.
[0048] The above is actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) transmits a signal. Next, actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) receives a signal is explained.
[0049] In this case, the serial signal of the unification rate supplied from the circuit change section 230 is returned to the serial signal of an intermediate rate by the rate adaptation circuit 213 (x). This speed conversion is performed by for example, data infanticide processing.
[0050] The serial signal into which transmission speed was changed by the intermediate rate is supplied to the mapping circuit 212 (x), and Signals RD, CD, and CS are extracted from it from a frame. Thereby, a serial signal with an original rate is acquired. This serial signal is supplied to the terminal unit 10 (x) which corresponds through the DTE interface circuitry 210 (x).
[0051] The above is actuation of the DTE channel section 210 (x) in case a terminal unit 10 (x) receives a signal. Next, actuation of the DCE channel section 220 (x) is explained, referring to drawing 3 .
[0052] First, actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) transmits a signal is explained.
[0053] in this case, the serial signal of the unification rate outputted from the circuit change section 230 -- present -- business or the spare rate adaptation circuit 221 (y) is supplied, and it is returned to the serial signal of an intermediate rate. this conversion output -- present -- business or the spare mapping circuit 222 (y) is supplied, and the original signals RD and CD are extracted from a frame. Thereby, the serial signal which has an original rate is acquired.
[0054] this serial signal -- present -- while business or the spare null modem circuit 223 (y) is supplied and the received-data signal RD is changed by the transmit data signal SD, the receiving Carrier Detect signal CD is changed by the Request-to-Send signal RS. Thereby, it is JIS. X A serial signal with the signals CD and RS specified by 5101 is acquired. this serial signal -- the DCE interface circuitry 224 (y) -- minding -- present -- it is sent out to the digital circuit access and terminating equipment 30 of business or a reserve (y).
[0055] The above is actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) transmits a signal. Next, actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) receives a signal is explained.
[0056] in this case -- present -- the serial signal supplied from the digital circuit access and terminating equipment 30 of business or a reserve (y) is supplied to the mapping circuit 222 (y) through the DCE

interface circuitry 224 (y) and the null modem circuit 223 (y), and is changed into the serial signal of an intermediate rate. This serial signal is changed into the serial signal of a unification rate by the rate adaptation circuit 221 (y).
[0057] The above is actuation of the DCE channel section 220 (x) in case a terminal unit 10 (x) receives a signal. Next, actuation of the circuit change section 230 is explained, referring to drawing 4 .
[0058] First, actuation in case a terminal unit 10 (x) transmits a signal is explained. In this case, Time Division Multiplexing of the serial signal of the DTE channel section 210 (1), 210 (2), --, N individual supplied from 210 (N) is carried out by the Time-Division-Multiplexing separation circuit 231. this Time Division Multiplexing -- 1 multiplex period -- present -- business -- it is carried out so that the time slot of the sum (N+1) with a number of circuit N and one reserved circuit may be set up.
[0059] this Time-Division-Multiplexing output is supplied to a time switch 233 -- having -- the need -- responding -- present -- business -- the time slot of a multiple signal-ed can be replaced between a circuit 40 (x) and a reserved circuit 40 (N+1).
[0060] namely, -- present -- business -- the serial signal outputted from the DTE channel section 210 (x) when the circuit 40 (x) was usable -- this -- present -- business -- it assigns a circuit 40 (x) and is positioned as it is by the **** time slot. on the other hand -- present -- business -- if the circuit 40 (x) is unusable, this serial signal will be assigned to a reserved circuit 40 (N+1), and will be positioned by the **** time slot. thereby -- a use circuit -- present -- business -- it changes from a circuit 40 (x) to a reserved circuit 40 (N+1).
[0061] This circuit change is controlled by the control section 235 based on the command given by the user using the actuation setting section 234.
[0062] The 2nd Time-Division-Multiplexing separation circuit 232 dissociates for every **********, and the Time-Division-Multiplexing signal outputted from a time switch 233 can be distributed to the corresponding DCE channel section 220 (y). thereby -- present -- business -- the serial signal with which a circuit 40 (x) is outputted from the DTE channel section 210 (x) when usable -- present -- the DCE channel section 220 of business (x) is supplied. on the other hand -- present -- business -- the serial signal with which a circuit 40 (x) is outputted from the DTE channel section 210 (x) when unusable is supplied to the spare DCE channel section 220 (N+1).
[0063] The above is actuation of the circuit change section 230 in case a terminal unit 10 (x) transmits a signal. Next, actuation of the circuit change section 230 in case a terminal unit 10 (x) receives a signal is explained.
[0064] After Time Division Multiplexing of the serial signal outputted also in this case from DCE channel section 220(1) -220 (N+1) is carried out by the 2nd Time-Division-Multiplexing separation circuit 232, it has a time slot replaced by the time switch 233 if needed. Then, the 1st Time-Division-Multiplexing separation circuit 231 dissociates for every **********, and the output of a time switch 233 can be distributed to DTE channel section 210(1) -210(N).
[0065] The above is actuation of the circuit change section 230 in case a terminal unit 10 (x) receives a signal.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of the gestalt of 1 operation of this invention.
[Drawing 2] It is the block diagram showing the configuration of the DTE channel section.
[Drawing 3] It is the block diagram showing the configuration of the DCE channel section.
[Drawing 4] It is the block diagram showing the configuration of the circuit change section.
[Drawing 5] It is drawing for explaining actuation of the DTE channel section.
[Drawing 6] It is drawing showing the configuration of the frame for mapping.
[Drawing 7] It is the block diagram showing the configuration of the gestalt of other operations of this invention.
[Description of Notations]
10(1) -10(N) -- Terminal unit
20 -- Protection switch
30 (1) - 30 (N) -- present -- the digital circuit access and terminating equipment of business
30 (N+1) -- Spare digital circuit access and terminating equipment
40 (1) - 40 (N) -- present -- business -- a circuit
40 (N+1) -- Reserved circuit
210(1) -210(N) -- DTE channel section
220(1) -220 (N+1) -- DCE channel section
230 -- Circuit change section
211 (x) -- DTE interface circuitry
212 (x) 221 (y) -- Mapping circuit
213 (x) 221 (y) -- Rate adaptation circuit
223 (y) -- Null modem circuit
224 (y) -- DCE interface circuitry
231,232 -- Time-Division-Multiplexing separation circuit
233 -- Time switch
234 -- Actuation setting section
235 -- Control section

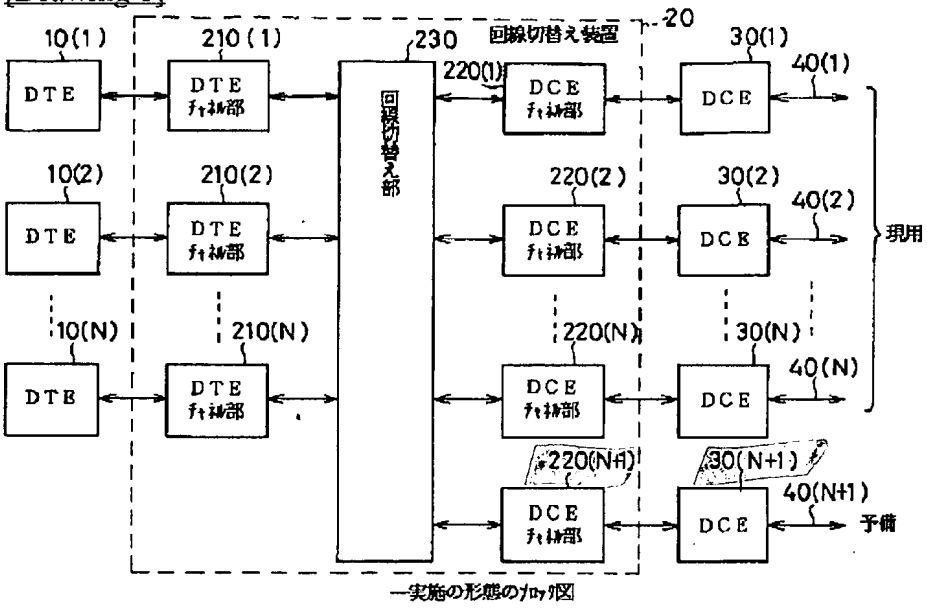
[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

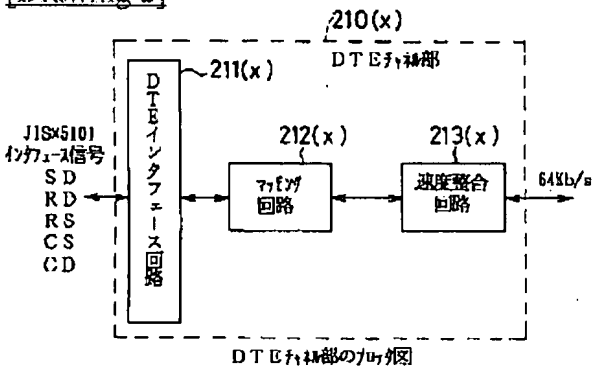
DRAWINGS

[Drawing 1]



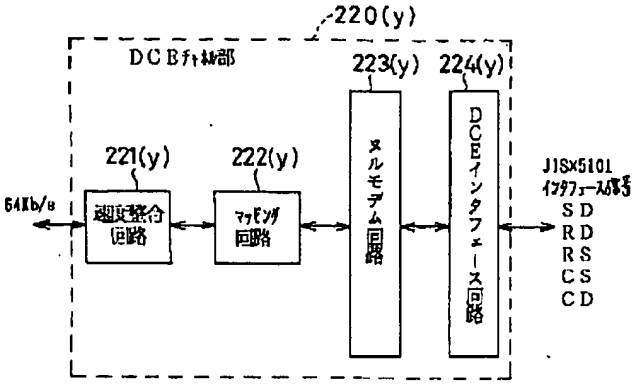
一実施の形態のブロック図

[Drawing 2]

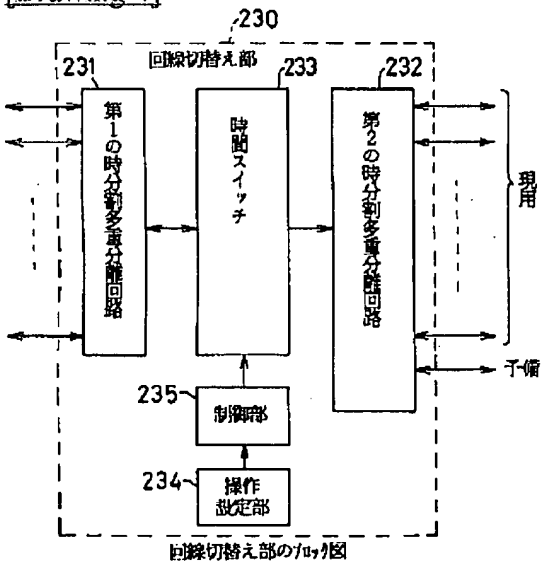


DTEﾁｬﾈﾙ部のブロック図

[Drawing 3]

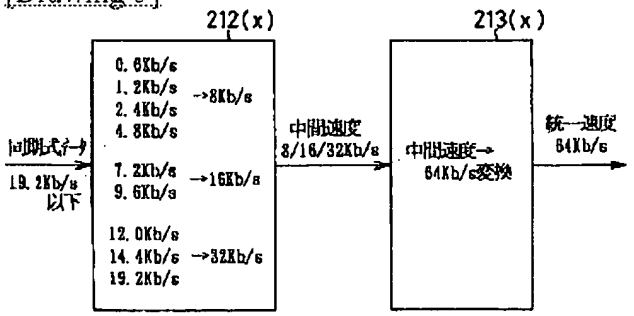


[Drawing 4]



回線切替え部のブロック図

[Drawing 5]



DTEチャネル部の動作説明図

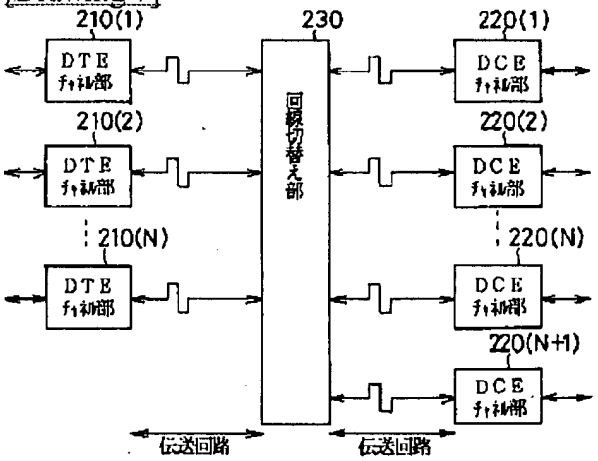
[Drawing 6]

オクテット番号	ビット番号							
	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0
1	1	D_1	D_2	D_3	D_4	D_5	D_6	S_1
2	1	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}	X
3	1	D_{13}	D_{14}	D_{15}	D_{16}	D_{17}	D_{18}	S_2
4	1	D_{19}	D_{20}	D_{21}	D_{22}	D_{23}	D_{24}	S_3
5	1	E_1	E_2	E_3	E_4	E_5	E_6	E_7
6	1	D_{25}	D_{26}	D_{27}	D_{28}	D_{29}	D_{30}	S_4
7	1	D_{31}	D_{32}	D_{33}	D_{34}	D_{35}	D_{36}	X
8	1	D_{37}	D_{38}	D_{39}	D_{40}	D_{41}	D_{42}	S_5
9	1	D_{43}	D_{44}	D_{45}	D_{46}	D_{47}	D_{48}	S_6

0, 1 :Pビット(フレーム・ビット) Si, X:ステータスビット
Di :データ転送用ビット E :速度表示ビット

フレーム構成図

[Drawing 7]



他の実施の形態のブロック図

[Translation done.]